REMARKS

Applicants thank the Examiner for the careful and thorough consideration given the application. In response to paragraph 4 of the Office action, headings have been added at appropriate locations in the specification. In response to paragraphs 5-12 of the Office action, the original claim set has been cancelled and a revised new claim set has been submitted as claims 18-42. In the new claim set the claims have been rewritten to address the concerns raised by the Examiner and to more appropriately express and cover the invented subject matter. Claim 25 finds support on page 4 line 11; claim 27 finds support on page 4 lines 18-21.

The present invention is directed to the use of one or more pectins for improving the stability of a foam head of a beverage, preferably beer. An important finding of the present inventors is that pectins will be decomposed during the preparation of the beverage if subjected to too much boiling during a boiling step, resulting in a decrease in the desired foam-stabilizing effect. Therefore, the pectins have to be added at such a stage during preparation that the undesired breakdown is avoided. Attached hereto is a signed Declaration of a technical expert of the assignee of the present application, describing experiments which illustrate the adverse effect of an extended boiling step on the stabilizing effect of pectins on a foam head.

As discussed in the Declaration, experiments were conducted to establish the effect of extended wort boiling on the foam stabilizing effect of pectins on the foam of beer.

Figs. 1 and 2 of the Declaration show that pectin is decomposed during boiling (100°C). The molecular weight and the intrinsic viscosity of the hop pectin preparations extensively decrease with an increased boiling time of 0-90 minutes (Fig. 1). Also, Fig. 2 shows that boiling of hop pectin for 90 minutes results in a shift from high to low molecular weight material. Figs. 3 and 4 show that the foam stabilizing effect of pectin substantially decreases with increasing boiling time from 0-90 minutes.

The foregoing shows that pectins are decomposed during boiling. High molecular weight pectins are decomposed into low molecular weight pectins. As the boiling time is increased and the molecular weight of the pectins drops, its foam stabilizing effect decreases. Accordingly, it has been discovered that the foam stabilizing effect of pectin is increased or preserved if it is subjected to a reduced amount of boiling time. As stated in paragraph 6 of the Declaration, "the foam stabilizing effect of pectins added at a late stage of the wort boiling is significantly better than that of pectins which are added prior to wort boiling." Pectins which are added earlier in wort boiling are more extensively decomposed and lose their foam stabilizing effect.

The claims are drafted in terms of this aspect of the invention. Claim 18 requires that the pectins be added at a stage of the preparation process "effective to prevent any substantial breakdown of said pectins." More specifically, claim 24 requires that the pectins be "added during said preparation process from 30 minutes before the end of said

wort boiling to the end of said preparation process." Claim 25 requires that the pectins be added "from about 10 minutes before the end of said wort boiling to the end of said preparation process." As can be seen, the claims require that the pectins be added at a point in the process effective to prevent substantial decomposition via boiling.

The applied references do not teach this discovery of avoiding excessive decomposition via wort boiling. Papazian ("The New Complete Joy of Home Brewing", page 64) states:

> In order to utilize the bittering acids of the hops you *must* boil the hops with the wort. This boiling is done in your brewpot for 30-90 minutes. A rolling boil is necessary in order to physically and actively mix the alpha and beta acids with the sweet wort. (italics original.)

This reference is obviously teaching in the wrong direction when it instructs that you must boil for 30-90 minutes. This will obviously decompose the pectins and is the precise problem the present invention seeks to avoid.

In The Practical Brewer, the only reference to boiling time is found on page 139, under Stability where it states "Badly stored hops that are boiled for a long period in the kettle (e.g., 90 minutes), may lose much of their "off aroma" and can contribute acceptable "bitterness units" to the finished beer...". This again teaches extended boiling time which will decompose the pectins, causing them to lose their foam stabilizing effect. This teaches in the opposite direction from the present invention.

Zymurgy teaches on pages 50-51 that Gater Tail Ale, Monster Malt, and Bulldog Bite should each have the wort boiled for 60 minutes. This is similar to the teaching of

Papazian, which, as noted, decomposes the pectins so that they lose their foam stabilizing ability.

Bukovskii, et al. (S.U. Pat. No. 685,689) teaches that froth forming agents should be "added to the wort prior to boiling". This reference again fails to appreciate that the boiling step decomposes the pectins beyond their foam stabilizing ability.

Since none of the references, singly or in combination, teach the invention of adding the pectins at a later stage to avoid excessive decomposition via boiling, it is believed that the claims as presently presented define over the applied references and should be allowed. For these reasons it is believed that a Notice of Allowance is in order and is respectfully requested.

If any further fees are required by this amendment which are not covered by an enclosed check, please charge such fees to our Deposit Account No. 16-0820, Order No. 29865.

Respectfully submitted,

PEARNE, GORDON, McCOY & GRANGER LLP

By John P. Murtaugh
John P. Murtaugh, Reg. No. 34226

1200 Leader Bldg.
Cleveland, Ohio 44114
(216) 579-1700

Date: March 24, 1998